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B65D 88/12

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B8P PA PK7 PL7

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GB 2207418 A GB 2203409 A GB 1343899 A
GB 1274300 A GB 1188881 A GB 0360187 A
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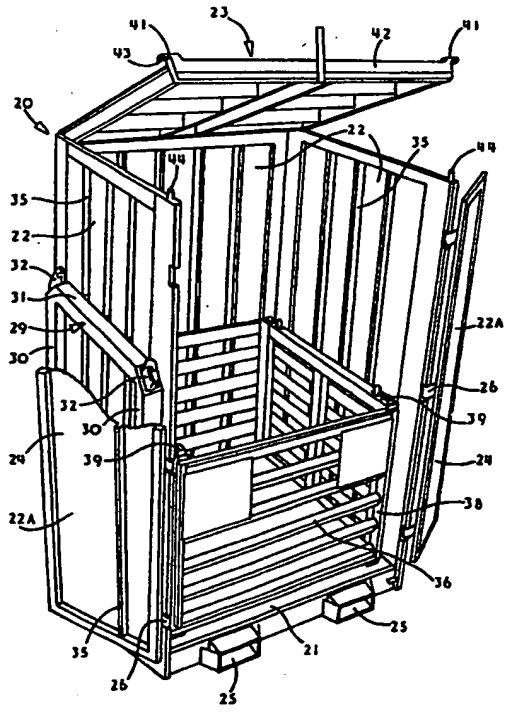
# (54) Offshore container

(57) An offshore container – especially, but not necessarily, a mini container – is characterised by the features that the container roof 23, as well as the side wall, incorporates openable and closeable door means for loading and unloading the container. The door means when closed seal the container in a substantially weather-proof manner. Lifting eyes 32 are provided on inverted U-shaped frames 29 and removable cages 36 are provided for holding items within the container.

Figure 2




At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.



GB 2 239 234 A

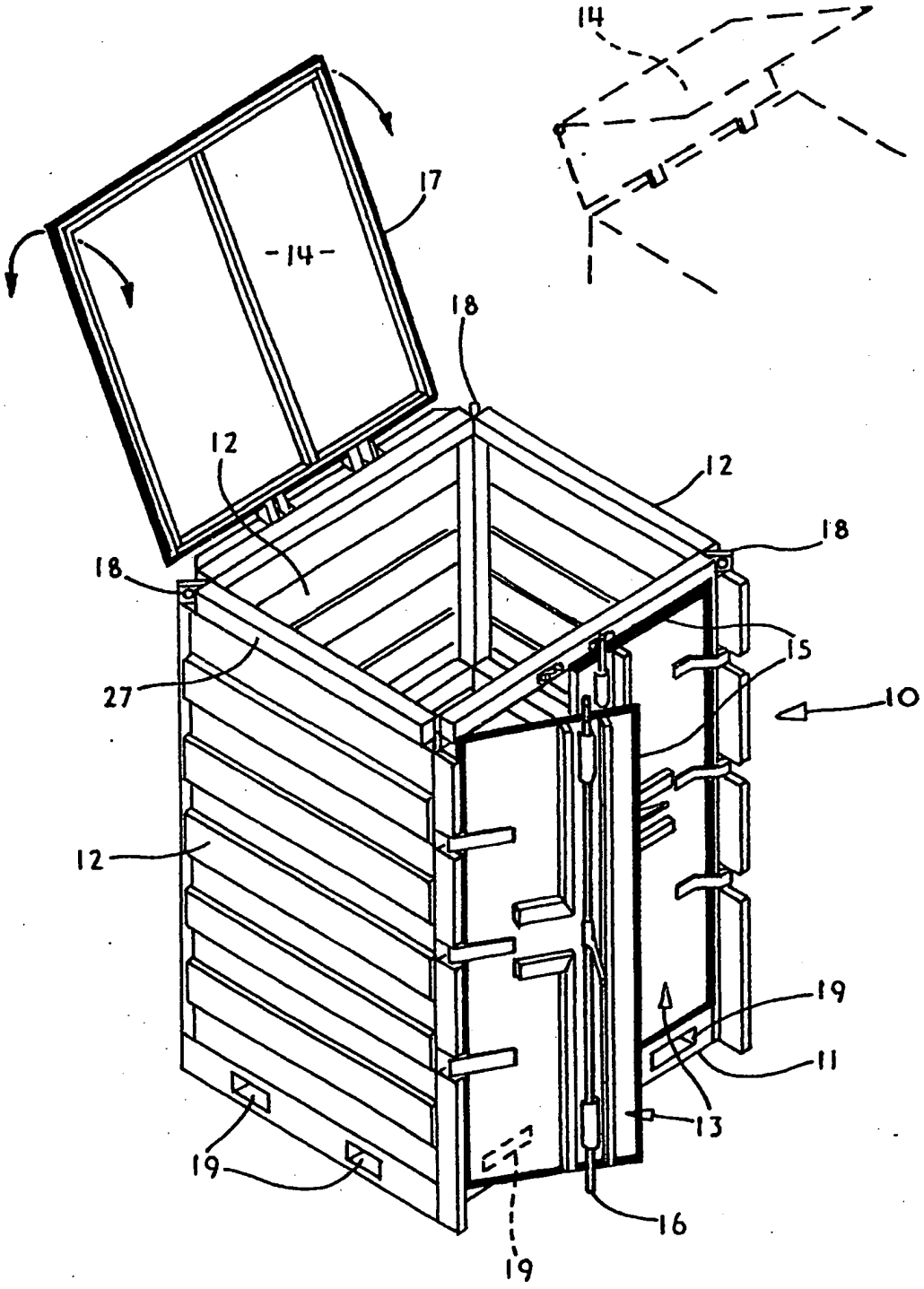



Figure 1

Figure 2

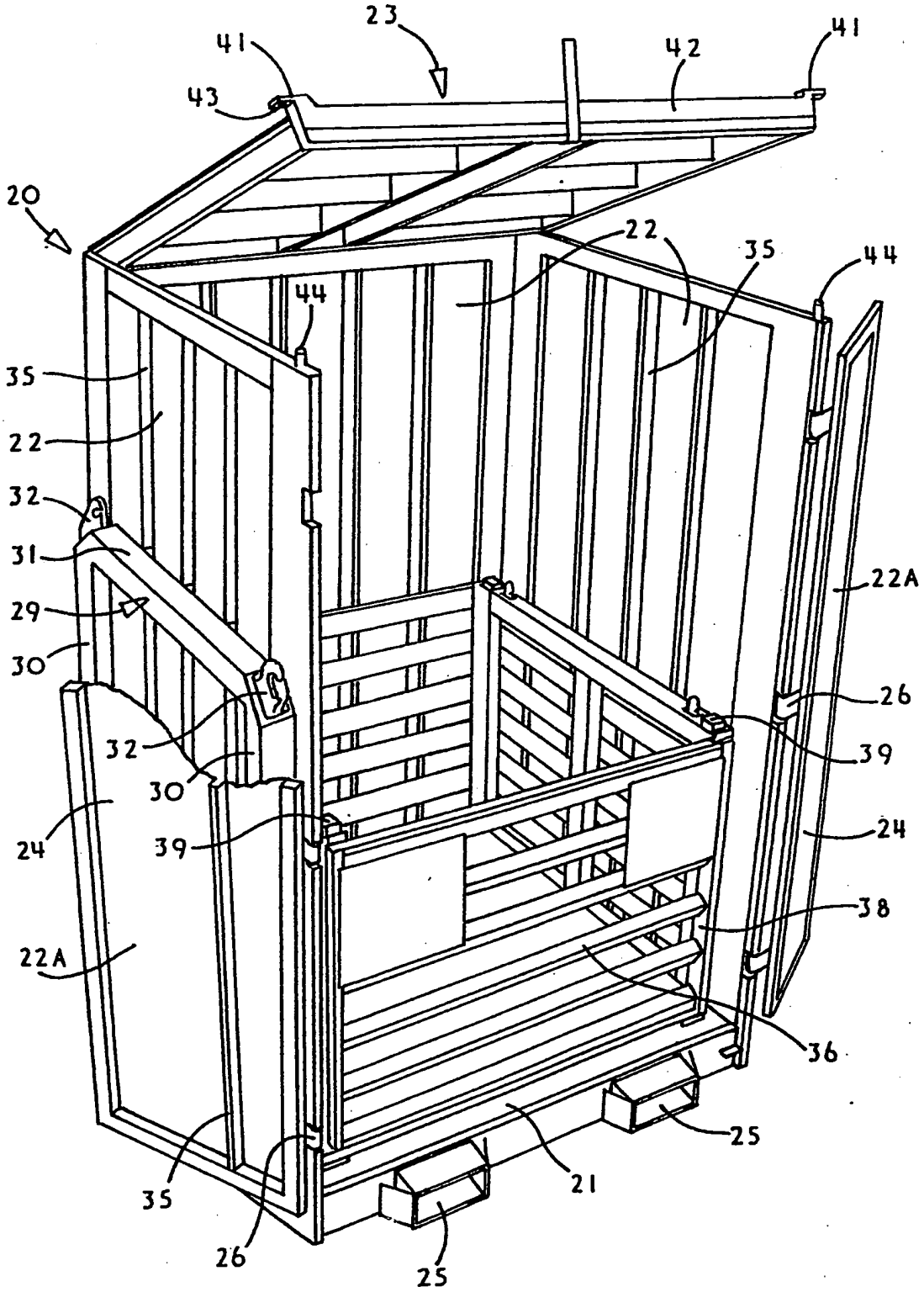

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Figure 3

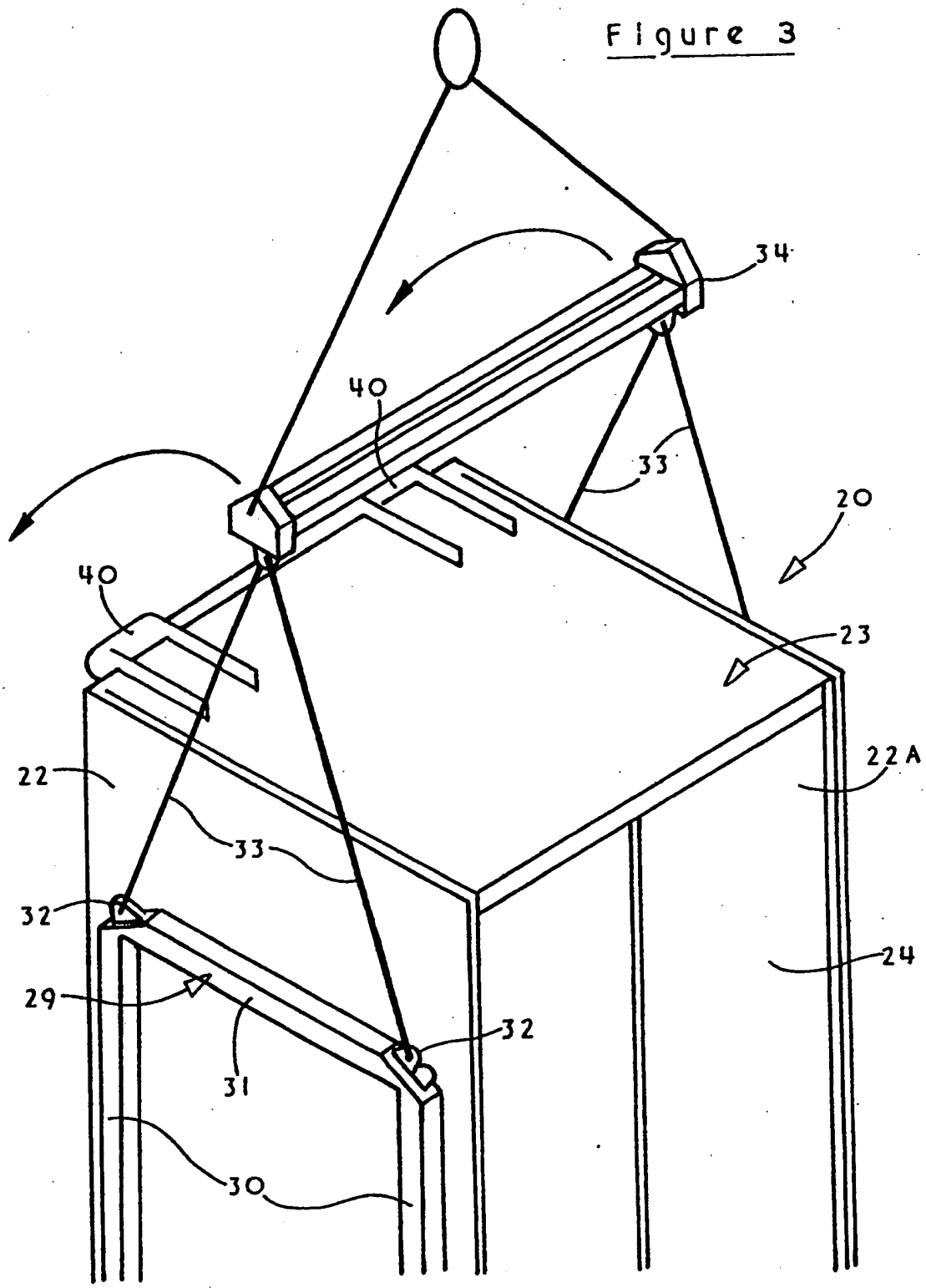


Figure 5

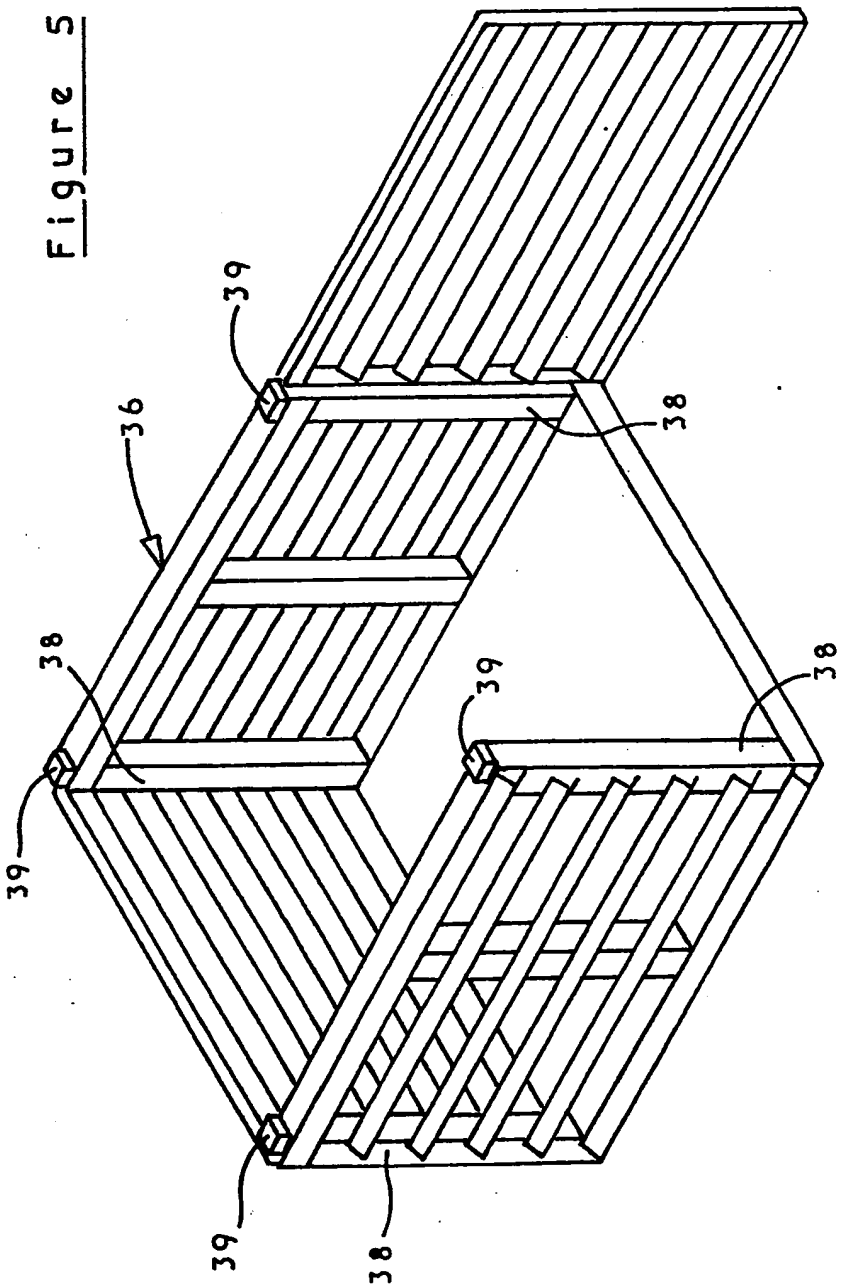
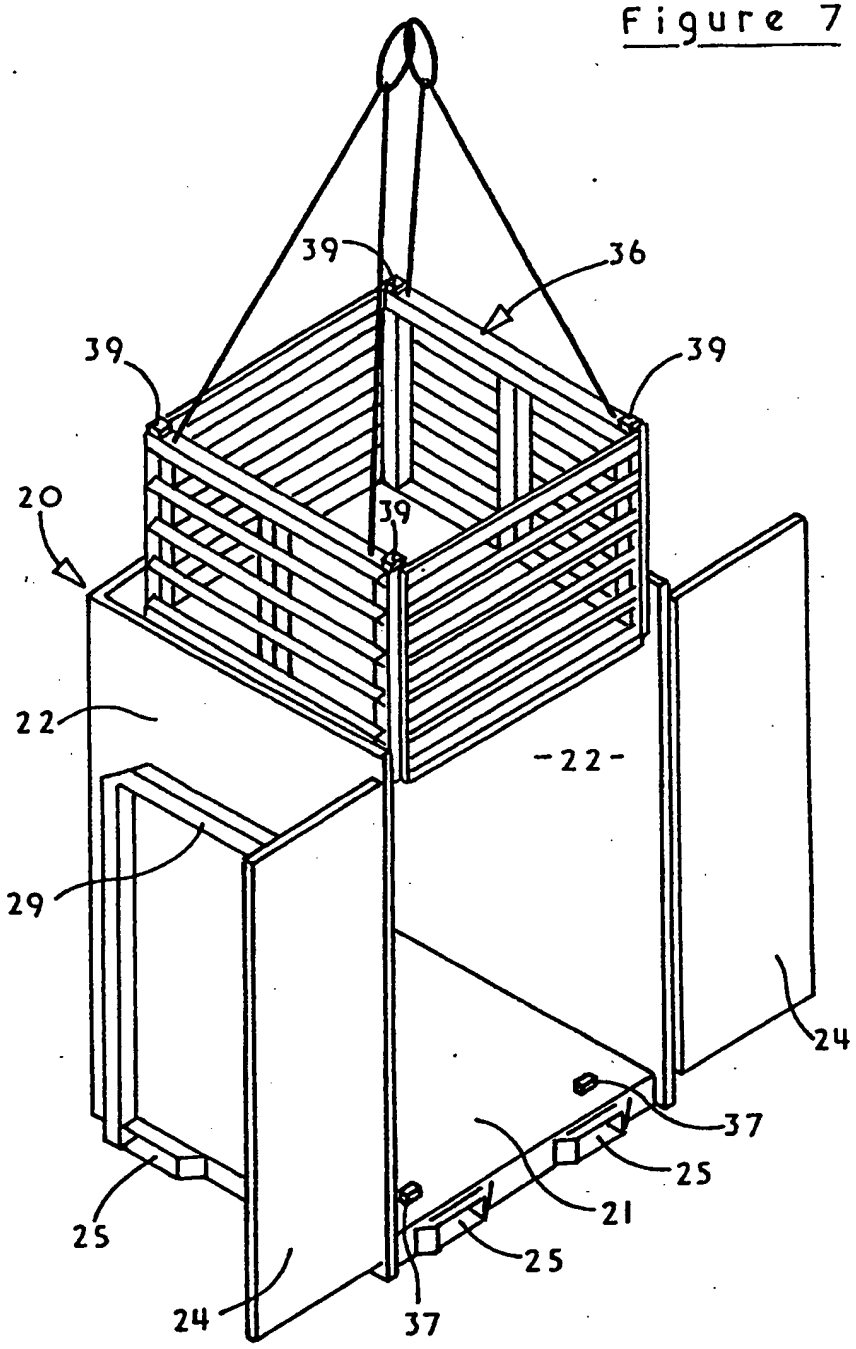


Figure 7



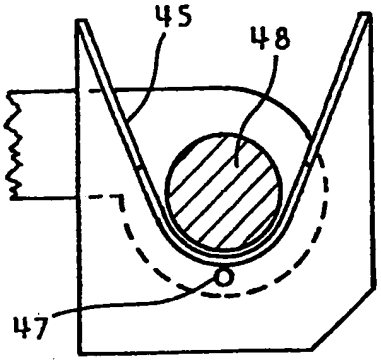



Figure 9

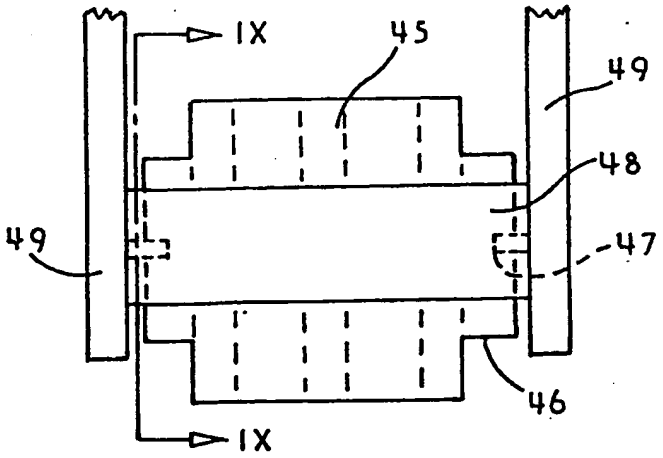



Figure 8

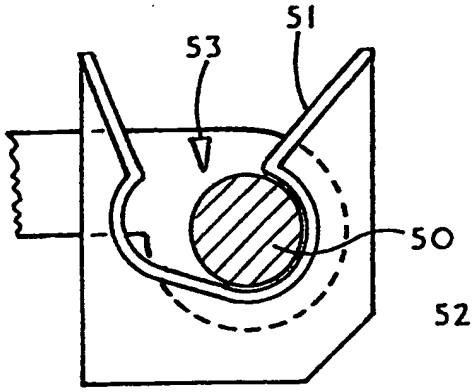



Figure 11

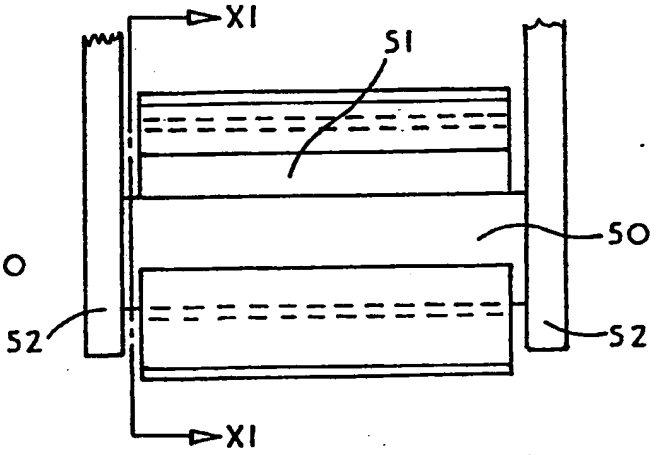



Figure 10

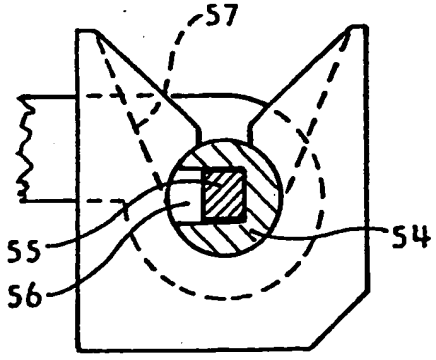



Figure 13

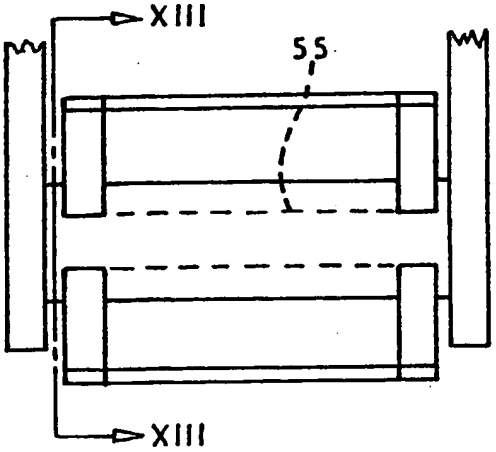
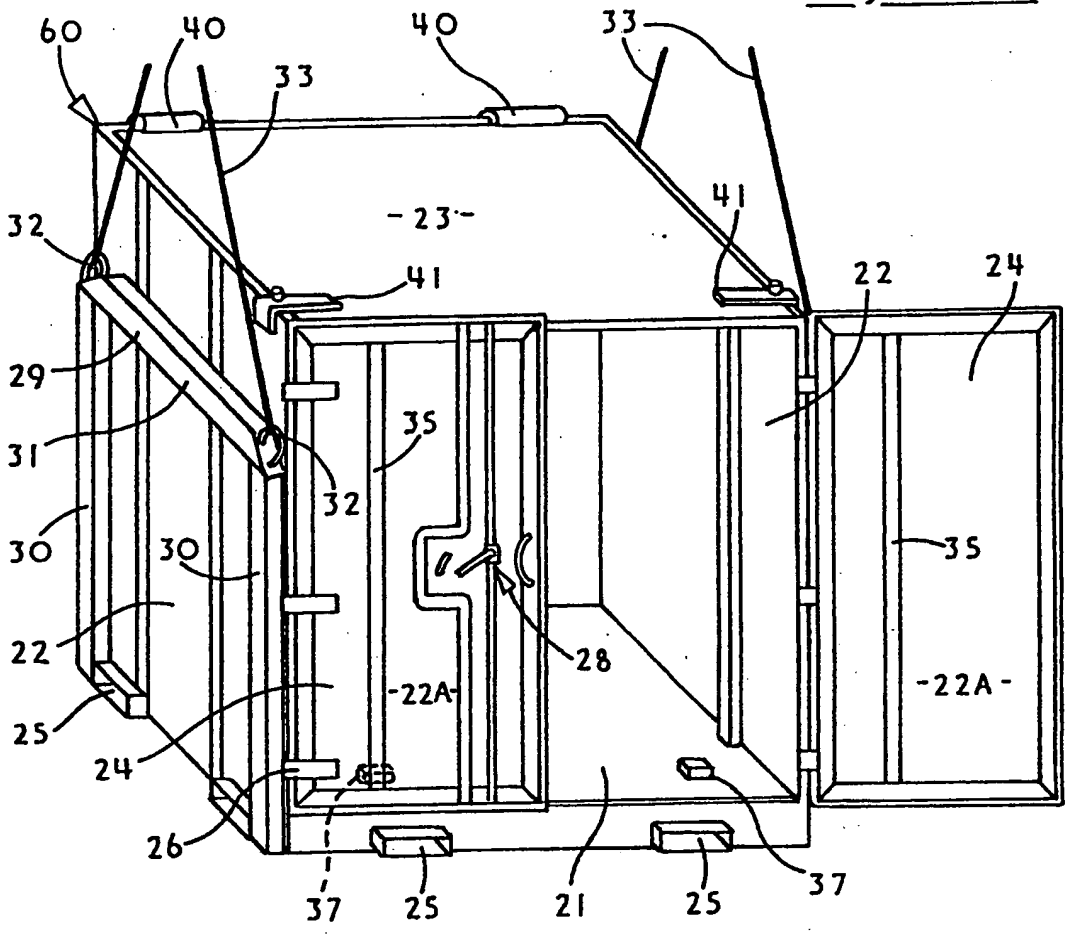



Figure 12

Figure 14



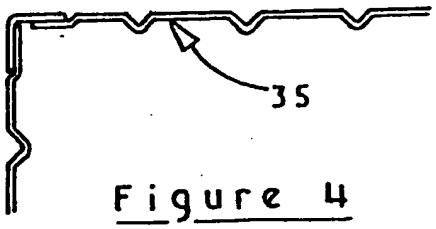




Figure 4

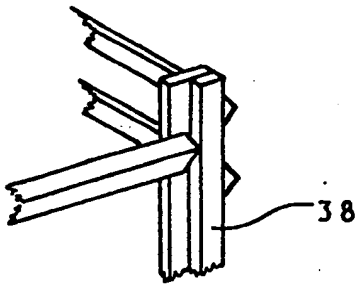



Figure 6

# OFFSHORE CONTAINER

## Background to the Invention

The invention relates to offshore containers.-

An offshore container is a container having a base, a roof, and respective side walls and incorporating means - for example, lifting eyes - by which the container can be lifted and manouvered, with its roof uppermost, into and out of the hold of a ship, an oil rig, or the like conditions of use; with one of the side walls of the container encompassing an openable and closeable door means for loading and unloading the container contents; and with the container being sealed in a substantially weather-proof mode when the door is closed.

The invention is particularly, though not exclusively, applicable to what are known as offshore mini containers. These are utilised for the transport of goods, materials and equipment, to, between and from offshore installations. They typically take the form of an all-steel rectangular box approximately 1.5 metres by 1.8 metres square and 2.5 metres high, with a double door making up one entire side. They are fitted with (typically) four lifting eyes, one at each respective corner of the roof of the container for lifting the container from above, to which lifting slings are (usually) permanently attached. When the loaded container is lifted by the lifting eyes, it is subject to relatively high stresses, the container will normally include a so-called "compression frame" to enable it to withstand the lifting stresses.

There are many thousands of such mini containers presently in service. They are filled and emptied, via the double-side-door, at locations both onshore and offshore. When onshore, these operations can be aided by forklifts and mechanical handling equipment. However, when offshore, the only major lifting appliance available for this task are the conventional platform cranes.

Because the container stands with its roof uppermost, ready for lifting, the cranes have to try to load and unload its contents via the single available side-double-door. This is of course not easy and leads to the common practice of either dragging loads from within the containers onto the deck, when unloading, or swinging the load in via the side door and then suddenly dropping it on the container base, when trying to load the container.

In either event, the crane driver can be unsighted, and even without this factor the practice is clearly inherently dangerous. It is not at all unknown for workers adjacent the containers to be seriously injured during such dragging and load-swinging manoeuvres by a crane especially when the crane driver is temporarily unsighted.

Prior Art

A search carried out by the United Kingdom Patent Office on patent application No 89 28933.4, from which the present application claims priority, revealed the following documents:

GB 2 207 418A

GB 1 343 899

GB 1 274 300

GB 1 188 881

US 4 802 600

US 4 603 787

Summary of the Invention

According to the invention, an offshore container - especially, but not necessarily, a mini container - is characterised by the features that the container roof, as well as the side wall, incorporates openable and closeable door means for loading and unloading the container, and that the said door means, like the one in the side wall, seals the container in a substantially weather-proof manner when the roof door is closed.

Preferably the roof door encompasses all or substantially all of the entire roof area of the container.

Preferably also, the roof door is so hinged to the rest of the container that it can swing back through approximately 270° to lie adjacent the side wall of the container.

The roof door may be a single opening door section or it may be a double-door. And in the latter case, the respective halves of the double-door may be hinged one to each opposite side of the container or to one another.

As well as - or instead of - swinging open, the roof door could slide open.

Any of the above offshore containers may include a compression frame located on the external walls of the container and below the peripheral top edge of the container.

The compression frame may comprise two opposite-side frames each defining an inverted U. The inverted U preferably extends from

the bottom edge of the container approximately two-thirds of the way up the container sides.

The compression frame will normally include lifting eyes at each of the four upper corners of the frame, wherein one equivalent eye on each frame is a quick-release lifting eye.

The offshore container described above is preferably adapted to receive a cage, or "pod", within the storage volume of the container. To accomplish this the container will normally include a stop on its base for locating a cage, or "pod".

The invention further encompasses an offshore container as described above in combination with a cage, or "pod". The cage, or "pod", is preferably adapted to locate on one of the stops referred to above. The cage, or "pod", also preferably includes at least one door, and more preferably includes a door on two of its opposing faces.

In an especially preferred embodiment the offshore container is adapted to receive a plurality of cages, or "pods", the cages, or "pods", being adapted to be stacked one on top of another.

An offshore container embodying any of these aspects of the invention (within the overall scope of the invention) gives clear advantages of ease of loading and unloading, by crane, in safety by comparison with the side-door-only conventional offshore container construction. In over ten years of testing mini containers for many operators, the applicants have not come across one with a roof door. Containers do exist with no roof at all, they are termed "half-heights" but they do not qualify as offshore containers within the meaning of the present invention because an offshore container has to seal in a substantially weather-proof mode when its door or doors are closed.

The invention will now be described, by way of example only, with reference to the drawings; in which:

Brief Description of the Drawings

Figure 1 is a perspective view of a first embodiment of an offshore mini container embodying the present invention;

Figure 2 is a perspective, partly cut-away, view of a second embodiment of an offshore mini container embodying the present invention;

Figure 3 is a diagrammatic perspective view of the container shown in Figure 2 in use;

Figure 4 is an enlarged cross-sectional view through a corner of the container shown in Figures 2 and 3, the line of cross-section being substantially parallel to the base of the container;

Figure 5 is a diagrammatic perspective view of a cage, or "pod", intended for use with the present invention;

Figure 6 is an enlarged view of a part of the corner structure of a cage, or "pod", shown in Figure 5;

Figure 7 is a diagrammatic perspective view of a cage, or "pod", in use;

Figure 8 is a plan view of a breakaway hinge which may be used as part of the present invention;

Figure 9 is a cross-sectional side view along the line IX-IX in Figure 8;

Figure 10 is a plan view of a second design of breakaway hinge which may be used with the present invention;

Figure 11 is a cross-sectional side view along the line XI-XI in Figure 10;

Figure 12 is a plan view of a third design of breakaway hinge which may be used with the present invention;

Figure 13 is a cross-sectional side view on the line XIII-XIII in Figure 12; and

Figure 14 is a perspective view of a container according to the present invention which is similar to that shown in Figures 2 - 13 except for some minor modifications.

Description of the Preferred Embodiments

In a first embodiment a container 10, as illustrated in Figure 1, is an essentially rectangular steel box having a base 11; respective side walls, three of which are referenced 12, the fourth referenced 13 and consisting of an opposite-hinged double-door; and a roof 14. It is welded up from rectangular hollow section frames with steel flat or corrugated plate cladding in known manner.

The openable and closeable double-door 13 incorporates seals, referenced generally 15, around each of its respective door-section peripheries. When the door sections are closed, the seals in combination with a locking mechanism 16 and the overall fit of the doors, cause the door to seal against the rest of the container in a substantially weather-proof manner.

The roof 14 incorporates similar seals, this time referenced 17, around the underside of its periphery. It is hinged, as shown, to swing open about one top edge of one of the side walls 12. And it swings from an initially closed position, where it is substantially horizontal as it stands waiting to be lifted in use, to a fully open position (not shown) where it lies adjacent the outside surface of

the side wall 12 to which it is hinged; and whence it has gone through an arc of swing of 270° from its initial closed position.

Here again, the fit and positioning of the roof 14, and the nature of the seals 17, is such that when the roof closes and is locked in position (by means which do not need to be illustrated or elaborated on) then the roof seals against the container in a substantially weather-proof manner.

Lifting eyes 18 are provided one at each respective corner of the roof-abutting periphery of the container 10, and spaced-apart slots 19 are provided in the base periphery so that the container can be handled onshore by a fork lift truck whose tines enter those slots 19.

As shown in broken line, and in part-view only, in the drawing, the roof door 14 could be a double-door with its two sections hinged to one another. Alternatively, as has already been mentioned, two sections of such a double-door roof could hinge one to each opposite side wall of the container and/or the roof door could slide into and out of position as well as, or instead of, swinging into and out of its closed position. Alternatively again, the roof instead of being hinged to the container walls could be removable in its entirety.

Figures 2 through 13 illustrate a container 20 which is a modified second embodiment of the one illustrated in Figure 1 and described above; this modified version is currently preferred. The basic construction is much the same as the Figure 1 container, in that the container of Figures 2 through 13 is an essentially rectangular all-steel box having a base 21, respective side walls 22 and a roof 23. One of the side walls 22A incorporates an opposite-hinged double-door 24, and both the doors and the roof seal against the surrounding periphery of the container in a substantially weather-proof manner.

Other points of similarity to the container of Figure 1 include the double-door external surface reinforcement and locking means; and the provision of spaced-apart slots 25 to take the tines of a fork lift truck when the container is being manhandled on shore. There are two of these slots in each peripheral base edge of the container so that the fork lift can approach and engage the container from any one of its four respective side walls.

The hinging mechanism 26 of the double doors is also identical to that of the container of Figure 1. And so is the locking mechanism 28 which holds those doors shut (not shown in Figures 2-13). Other similarities are apparent from the drawings.

A comparison of Figure 1 with Figures 2 through 13 will show that there are four main areas of difference between the later container 20 and the earlier one illustrated. Firstly, the "compression frame" (see below) of the container has been deliberately relocated. Secondly, the interior and exterior surface panels are differently ribbed from those of the earlier container. Thirdly, two stacking cages or "pods" are incorporated into the container design. Fourthly, the roof is provided with a "breakaway" hinge mechanism so that if the roof goes over-centre when it is being opened, it will come away entirely from the back edge of the container.

These differences will now be described in more detail.

1. The Relocation of the Compression Frame

The container of Figure 1 is relatively conventional in its compression frame design. The compression frame is the reinforced box-section steel frame which runs around the top periphery of the container and is clearly illustrated in Figure 1 - indicated by reference numeral 27. The lifting eyes 18 of that container 10 are spaced at the four corners of that frame 27 and hence of the container itself.

This construction has been found to limit the loads that can be placed inside the container, because of the compression forces which the peripheral compression frame will experience as the container is lifted off the ground. There is clearly a limit to the frame strength, given the need to optimise the strength/weight balance. It has further been found that the location of the lifting eyes 18 at the top corners of the container is inconvenient.

The container of Figures 2 through 13 effectively repositions the compression frame on the external walls of the container and below the peripheral top edge of the container. The compression frame now comprises two opposite-side frames 29, each of box section steel, each effectively defining an inverted U extending from the bottom edge of the container approximately two-thirds of the way up the container sides.

Figure 2 shows the limbs 30 and the base member 31 of one of these inverted U frames 29. There is another one on the opposite side wall 22 of the container 20, but neither the back nor the front of the container is similarly reinforced. The front of course contains the double-doors 24 whilst the back is constructed of ribbed sheeting inside an appropriate peripheral box-section frame.

Lifting eyes 32 are located one at each opposite end of the member 31. There is thus a total of four lifting eyes, just as there were four eyes 18 in the Figure 1 container. The eyes 32 may take the form of shackle-type eyes, i.e eyes which can be unclasped to admit the looped ends of conventional cables 33 hanging from a spreader bar 34 by means of which the container is lifted in use. In this embodiment there are lifting eyes 32 at each of the four upper corner of the compression frame 66, the eye distanced from the roof hinge on each U frame is a quick-release shackle-type eye whilst the eye nearest the roof hinge on each U frame is a conventional closed-loop eye which cannot be unclasped to admit the looped ends of conventional cables 33. This

provides the advantage that the cables 33 may be removed from the quick-release eyes and the spreader bar 34 moved to the rear of the container 20 to allow convenient vertical access through the roof of the container 20; this is shown most clearly in Figure 3.

A primary advantage of repositioning and redesigning the compression frame in this way is that the previous danger of crushing-in the top of an overloaded container is avoided. The load is spread over, and resisted by, an appreciable region of the container side walls rather than being concentrated wholly on the previous conventionally-positioned peripheral top frame box sections alone. Furthermore, the height of the eyes 32 will now, normally, be around shoulder-height allowing for convenient manipulation of the eyes 32 in cooperation with the cables 33.

2. The Internal and External Panel Ribbing

Conventional offshore containers of the kind in question may be flat-walled inside. Or they may - like the container of Figure 1 - exhibit rectangular-section corrugations. The modified container 20 of Figures 2 through 13 has triangular-section vertical ribs running over its opposite inside walls and its back walls. The same section reinforcement is displayed, and is indicated by reference numeral 35, in each door of the double-door unit 24 of Figure 2.

Figure 4 illustrates this vertical-running triangular-section reinforcement of the panels of the modified container, showing a corner region of the container in plan and section diagrammatically. The V-section ribs serve to reinforce the wall panels and this helps the overall design in that it makes it possible for the "opposite-sides-only" and relocated compression frame 30, 31 to be used.

3. The Cages ("Pods")

Two steel cages 36 are designed to fit into the Figure 2 container, one of the cages is shown already situated in the container. It is conventional to load goods into offshore containers through the doors and/or the roof without any such internal cages 36. This limits, in many instances, the kind and/or weight of loads the container can carry. Very often such a container will be under-used as a result of carrying goods well below its designed weight capacity.

The two cages 36, or "pods", shown in Figure 5 stand one on top of another inside the container 20. They are each constructed from V-section steel strip. The V-sections run horizontally when the cages 36 are in place inside the container 20. Each cage 36 has doors on two of its opposing faces thus allowing convenient access to, and egress from, the cage; this is shown clearly in Figure 5. Cages of varying heights may be used and the cages need not be of the same height.

Figure 6, drawn to an enlarged scale, shows a corner detail of one of the cages 36 of Figure 5. This shows the vertical staggering of the V-section rails running on adjacent sides of the cage 36.

There are two stops 37 (see Figure 7) positioned on the container floor and welded to it just inside the double-door entrance. The bottom one of the cages 36 has front feet 38 which locate on these stops 37. Each cage 36 has four such feet 38, one at each of its corners, and has stops 39 - identical to the stops 37 - at each of its four top corners so that the other cage 36 can stack on top of it.

A cage, or "pod", can be seen in use in Figure 7. The cage shown in this Figure is pre-slung for convenient handling by a crane.

4. The Breakaway Roof Hinge

The roof 23 of the container of Figure 2, like that of Figure 1, swings about the container back edge and can be opened and closed by the same crane that lifts the container via bar 34 and cables 33.

There is a danger, however, of the crane inadvertently continuing to lift the roof - and hence starting to up-end the container - as the roof goes "over-centre" on its hinge. In other words, once the roof gets to the vertical and is at right angles to the top peripheral edge of the container, the crane should then stop lifting. If the crane continues to lift, all the weight of the loaded container is thrown onto the roof hinge. Even if the hinge does not give way, with its consequent danger, it is clearly just as dangerous for the container to continue to be lifted in this way in an essentially uncontrolled manner.

On the Figures 2 through 13 container (see especially Figure 3) the roof hinge is a breakaway hinge 40. If the roof 23 goes over-centre, it will come away entirely from the back edge of the container about which is normally hinged. Figures 7-12 show details of three possible hinge mechanisms and this mechanism works in conjunction with tabs 41 as illustrated in Figure 2.

With the roof 23 in its partly open state, as shown in Figure 2, the tabs 41 can be clearly seen on either end of a header bar 42 which forms the front edge of the roof 23. The tabs 41 have bores 43 therethrough which are adapted to receive threaded studs 44. With the roof 23 closed the studs 44 protrude through the bores 43 and co-operating fastening means, such as wing nuts (not shown), may be used to hold the roof 23 in place whilst the container is being manouvered. It will be appreciated that other fastening means may be utilised. The roof 23 fits, as illustrated, down inside the peripheral top edges of the container walls. The tabs 41 and the studs 44, together with the hinge arms thus act in conjunction with the container wall peripheral edges to keep the roof normally in place.

To unfasten the roof 23, the wing nuts (or other fastening means) are removed to allow the roof 23 to be lifted open about its hinge 40. The bores 43 may be used as lifting eyes to enable this; alternatively, the roof 23 may be lifted by allowing a hook to engage the header bar 42. The hinge 40 works normally unless and until the roof starts to go over-centre, i.e the crane continues to lift despite the fact that the roof has risen to 90° from its closed position.

In that situation, the roof 23 is effectively constrained to move no more than 90° and any continued attempted lifting of it would normally start to up-end the container about its front bottom edge (the edge below the double-doors 24). But the breakaway hinge 40 then operates automatically so that the roof 23 is lifted clear from the rest of the container 20.

Three possible designs of breakaway hinges 40 are shown in each of Figures 8 and 9, 10 and 11, and 12 and 13. Each of these hinge designs are duplicated on the rear lip of the container 20 as shown in Figure 3; each design will now be described in turn.

Figures 8 and 9 show a breakaway hinge comprising a hinge cup 45, a hinge cup lip 46, a locking pin 47 and a hinge bar 48. The hinge bar 48 is located between hinge arms 49 in the hinge cup 45. The locking pin 47 is constrained beneath the hinge cup lip within the hinge cup 45. If the roof 23 is rotated to provide a vertical force of sufficient magnitude, normally with the roof 23 having been rotated through approximately a right-angle from its closed position, the pin 47 is able to slide up the flared cup 45 allowing the pin 47 to clear the hinge cup lip 46 and the roof 23 to be released from the container.

Figures 10 and 11 show a second breakaway hinge design in which a hinge bar 50 is constrained within a shaped recessed hinge cup 51 between hinge arms 52. The shape of the hinge cup 51 is such that the hinge bar 50 rests in a held position in which

it can rotate in the rear of the cup 51 under the force of gravity. If the roof is lifted over centre then, if sufficient upward force is applied, the hinge bar 50 moves forwards and upwards in the cup 51 and egresses from the hinge cup through gap 53.

A third hinge design is shown in Figures 12 and 13 in which a hinge bar 54 has a hinge lug 55 of substantially rectangular cross-section at each end thereof. Each of the lugs 55 is coupled with a cup slot 56 which rotates with the lug 55. The lug 55 can only move linearly along the cup slot 56. When the slot 56 becomes aligned with a slot in the hinge cup 57, at which point the roof reaches the vertical, the lug 55 is allowed to pass out from the confines of the hinge cup 57.

It should be noted that if the roof 23 is merely rotated about the hinges 40 without any significant vertical force component then the roof 23 may be rotated through a full 270° to lie adjacent the rear wall of the container 20.

Each of the hinge cups 45, 51 and 57 are flared upwardly as can be seen in Figures 8, 10 and 12; this allows the roof 23 to be lowered on to the hinges 40, to re-locate the hinges on the container, whilst allowing for a certain amount of inaccuracy in the re-location.

Breakaway hinge designs are, as a general concept known per se.

A container 60, which is similar to that illustrated in Figures 2-13, is shown in Figure 14. The minor modifications between the two designs are apparent from the drawings, although the following differences are noted.

The notable differences are apparent in the roof structure fastening means and in the provision for means to enable the roof to be lifted by a crane. These differences will now be described

more fully using the same reference numerals as those used for the second embodiment above for similar parts.

On the Figure 14 container 60 the roof hinge is a breakaway hinge 40 similar to those described above. The hinges 40 work in conjunction with tabs 41 each of which is pivoted to the container top periphery as illustrated in Figure 14.

With the roof 23 shut, as Figure 14 shows, each of the tabs 41 is swung into its illustrated position in which it projects across the top surface of the roof for a short distance and runs generally at right angles to the container sides which support the repositioned compression frames 29. The tabs 41 can then, if necessary, be tightened down on their pivots so as not to alter their position when the closed-roof container 60 is being manouvered. The roof 23 fits, as illustrated, down inside the peripheral top edges of the container walls. The tabs 41 together with the hinge arms thus act in conjunction with the container wall peripheral edges to keep the roof 23 normally in place.

To unfasten the roof 23, tabs 41 are swung out of the way to allow the roof to be lifted open about its hinge. Lifting eyes 32 may be provided adjacent the front edge of the roof top surface to allow this. The breakaway hinge 40 operates in an identical fashion to those described above in relation to the embodiment of Figures 2 through 13 should the roof be lifted over-centre.

Each of the embodiments of the offshore containers described above is constructed in accordance with the requirements of British Standard BS 7072: 1989

It will be appreciated by those skilled in the art that certain features of the embodiments described above may be combined if desired.

CLAIMS:

1. An offshore container - especially, but not necessarily, a mini container - is characterised by the features that the container roof, as well as the side wall, incorporates openable and closeable door means for loading and unloading the container, and that the said door means, like the one in the side wall, seals the container in a substantially weather-proof manner when the roof door is closed.

2. An offshore container according to Claim 1 and in which the roof door encompasses all or substantially all of the entire roof area of the container.

3. An offshore container according to Claim 1 or Claim 2 and in which the roof door is so hinged to the rest of the container that it can swing back through approximately 270° to lie adjacent the side wall of the container.

4. An offshore container according to any of the preceding Claims and in which the roof door is a double-door.

5. An offshore container according to any of the preceding Claims and in which the roof door can slide open.

6. An offshore container according to any of the preceding Claims and in which the roof door is wholly removable from the container.

7. An offshore container according to Claim 6 and in which the roof is hinge-connected to the rest of the container by a breakaway hinge mechanism.

8. An offshore container according to any preceding Claim and in which the container includes a compression frame located on

the external walls of the container and below the peripheral top edge of the container.

9. An offshore container according to Claim 8 and in which the compression frame comprises two opposite-side frames each defining an inverted U.

10. An offshore container according to Claim 9 and in which the inverted U extends from the bottom edge of the container approximately two-thirds of the way up the container sides.

11. An offshore container according to any one of Claims 8 to 10 and in which the compression frame includes lifting eyes at each of the four upper corners of the frame, wherein one equivalent eye on each frame is a quick-release lifting eye.

12 An offshore container according to any preceding Claim and in which the container is adapted to receive a cage, or "pod", within the storage volume of the container.

13. An offshore container according to Claim 12 and in which the container includes a stop on its base for locating the cage, or "pod".

14. An offshore container according to Claim 13 and in which the cage, or "pod", is adapted to locate on one of the stops

15. An offshore container according to any one of Claims 12 to 14 and in which the cage, or "pod", also includes at least one door.

16. An offshore container according to Claim 15 and in which the cage, or "pod", includes a door on two of its opposing faces.

17. An offshore container according to any one of Claims 12 to 16 and in which the offshore container is adapted to receive a plurality of cages, or "pods".

18. An offshore container according to Claim 17 and in which the cages, or "pods", are adapted to be stacked one on top of another.

19. An offshore container according to any one of Claims 12 to 18 in combination with a cage, or "pod".

20 An offshore container system which comprises the combination of an outer container with at least one inner cage, wherein the cage has a plan area substantially the same as the internal floor area of the outer container and the outer container has respective openable doors which seal closed occupying substantially the entire areas of the roof and of at least one side wall of the outer container, whereby the cage can be lowered into the outer container or extracted from the container from above or inserted into or extracted from the outer container from the said at least one side.

21. An offshore container substantially as described herein with reference to and as illustrated in Figures 2 to 9, or Figures 2 to 7 with Figures 10 and 11, or Figures 2 to 7 with Figures 12 and 13, or Figure 14 of the accompanying drawings.

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